

WHAT IS CLAIMED IS:

1           1.     A method comprising the steps of:  
2                     providing a surgical needle having a surface;  
3                     contacting the surface of the needle with a pretreating solution comprising an acid  
4     to form a pretreated needle.

5           2.     The method of claim 1 wherein a lubricant composition is applied on at least a  
6     portion of the surface of the pretreated needle.

1           3.     The method of claim 1 wherein the acid is a mineral acid selected from the group  
2     consisting of hydrochloric acid, sulfuric acid, phosphoric acid, hydrobromic acid, nitric acid, and  
3     water soluble salts thereof.

1           4.     The method of claim 1 wherein the acid is an organic acid selected from the  
2     group consisting of citric acid, acetic acid, tartaric acid, trifluoroacetic acid, and water soluble  
3     salts thereof.

1           5.     The method of claim 1 wherein the pretreating solution comprises citric acid in a  
2     concentration of about 1.0 wt.% to about 10 wt.%.

1           6.     The method of claim 2 further comprising the step of rinsing the surface of the  
2 needle after applying the pretreating solution but before applying the lubricant composition.

1           7.     The method of claim 2 wherein the lubricant composition comprises a silicone.

1           8.     The method of claim 2 wherein the lubricant composition comprises an  
2 aminoalkyl siloxane.

3           9.     The method of claim 8 wherein the lubricant composition further comprises a  
4 second siloxane that is copolymerizable with the aminoalkyl siloxane.

1           10.    The method of claim 8 wherein the lubricant composition further comprises a  
2 second siloxane that does not copolymerize with the aminoalkyl siloxane.

1           11.    The method of claim 8 further comprising the step of curing the aminoalkyl  
2 siloxane.

1           12.    The method of claim 2 wherein the lubricant composition comprises a  
2 polydimethylsiloxane having amino and alkoxy functional groups.

3           13.    The method of claim 2 wherein the lubricant composition comprises a  
4 polydimethylsiloxane and hexane.

1           14.    The method of claim 11 wherein the step of curing the lubricant composition

2 comprises:

3                   subjecting the lubricant composition to an atmosphere of from about 20% to about  
4 80% relative humidity, at a temperature from about 10°C to about 50°C for a time period ranging  
5 from about 1 hour to about 6 hours; and,

6                   heating to a temperature of from about 100°C to about 200°C for a time period  
7 ranging from about 2 hours to about 48 hours to effectively polymerize the lubricant  
8 composition.

9           15.    A method for manufacturing a siliconized surgical needle comprising the steps of:

10                   providing a surgical needle having a surface;

11                   contacting the surface of the needle with a pretreating solution comprising an acid  
12 to form a pretreated needle;

13                   applying a lubricant composition to at least a portion of the surface of the  
14 pretreated needle, the lubricant composition comprising at least one polydialkylsiloxane and at  
15 least one other siliconization material which does not covalently bond with the  
16 polydialkylsiloxane, the siliconization material being capable of crosslinking; and,

17                   curing the lubricant composition on the surface of the needle whereby the  
18 siliconization material cross-links to physically interlock the polydialkylsiloxane in the coating  
19 and provide an interpenetrating network coating.

1           16.    The method of claim 15 wherein the acid is a mineral acid selected from the group  
2   consisting of hydrochloric acid, sulfuric acid, phosphoric acid, hydrobromic acid, nitric acid, and  
3   water soluble salts thereof.

1           17.    The method of claim 15 wherein the acid is an organic acid selected from the  
2   group consisting of citric acid, acetic acid, tartaric acid, trifluoroacetic acid, and water soluble  
3   salts thereof.

1           18.    The method of claim 15 further comprising the step of rinsing the surface of the  
2   needle after applying the pretreating solution but before applying the lubricant composition.

3           19.    The method of claim 15 wherein the step of curing comprises:  
4                    subjecting the lubricant composition to an atmosphere of from about 20% to about  
5   80% relative humidity, at a temperature from about 10°C to about 50°C for a time period ranging  
6   from about 1 hour to about 6 hours; and,  
7                    heating to a temperature of from about 100°C to about 200°C for a time period  
8   ranging from about 2 hours to about 48 hours.

1           20.    An article of manufacture comprising:  
2                    a surgical needle having a tip portion, a body portion and suture attachment  
3   portion, at least a portion of a surface of the surgical needle being acid-treated; and

4 a silicone-containing coating applied over the acid-treated portion of the surgical  
5 needle.

1 21. An article of manufacture as in claim 20 wherein the silicone-containing coating  
2 comprises an aminoalkyl siloxane.

1 22. An article of manufacture as in claim 20 wherein the silicone-containing coating  
2 comprises an interpenetrating network.

3 23. An article of manufacture as in claim 20 wherein the silicone-containing coating  
4 comprises a copolymer of an aminoalkyl siloxane and a second siliconization material.

1 24. A surgical needle having reduced penetration force comprising:  
2 a surgical needle having an acid-treated surface; and  
3 a silicone-containing coating on at least a portion of the acid treated surface,  
4 whereby the surgical needle has a penetration force on a fifth pass through tissue  
5 that is at least 10% less than the penetration force on a fifth pass through tissue of a needle  
6 having the same silicone-containing coating on the same surgical needle having no surface that is  
7 acid treated.

1 25. A surgical needle as in claim 24 wherein the silicone-containing coating  
2 comprises an aminoalkyl siloxane.

1           26.    An article of manufacture as in claim 24 wherein the silicone-containing coating  
2   comprises an interpenetrating network.

1           27.    An article of manufacture as in claim 24 wherein the silicone-containing coating  
2   comprises a copolymer of an aminoalkyl siloxane and a second siliconization material.

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